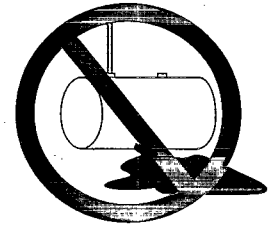


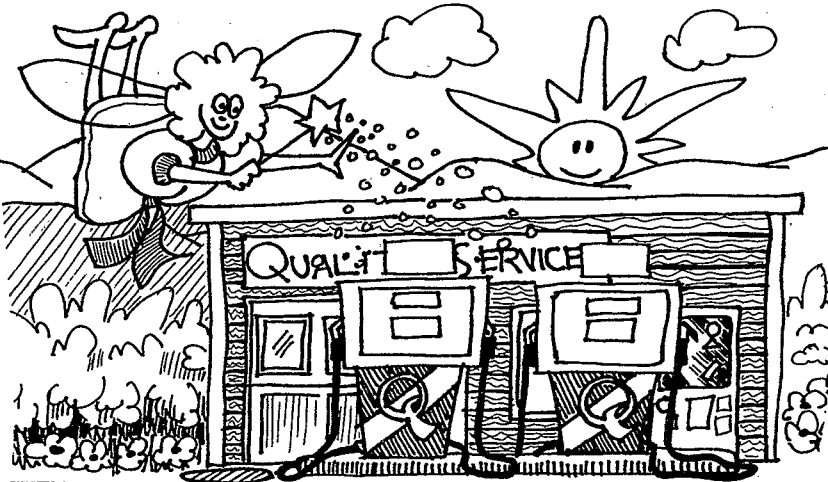
L.U.S.T. LINE

A Report on Federal & State Programs To Control Leaking Underground Storage Tanks



Is Leak Detection Working?

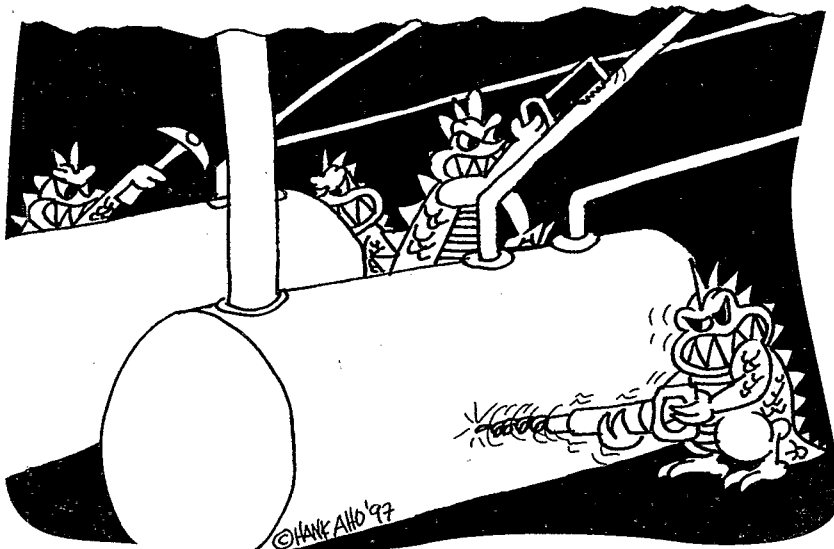
by Marcel Moreau



It is the cherished dream of every UST owner/operator that his or her underground storage tank system is not leaking...not a drop. It is the recurring nightmare of many an UST regulator that every tank leaks...more than a drop. In reality, some USTs are leaking and some are not. The question is: "How do we distinguish between USTs that are tight and USTs that are leaking?"

The notion that there should be leak detection for USTs is not new. The 1913 edition of the National Fire Prevention Association's NFPA 30 suggests that "test wells" be installed adjacent to tanks to detect leaks. By 1941, NFPA was recommending periodic testing of older tanks. In 1951, the American Petroleum Institute published the first edition of its recommended practices for inventory control.

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Somewhere between the cherished dream and the nightmare lies reality.

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■ Is Leak Detection Working? from page 1

The Petro-tite tank tester can trace its heritage to the 1950s, when Fred McLean set out to find a method of tank testing that was safer than air pressure and more reliable than standpipe testing. Mr. McLean's research came to fruition with the "Kent-Moore" tank tester which became commercially available in the mid-1960s and was renamed Petro-Tite in the early '80s when the rights to the equipment were sold.

But, while an awareness of the issue of leak detection for USTs has been long-standing, that awareness has not routinely been followed by effective action to detect or prevent leaks. NEPA's idea back in 1913 for test wells never took root. By 1941, the association was struggling to deal with increasingly large numbers of leakers that were creating fire and safety hazards. In the 1960s, the petroleum marketing trade press documents an increasing awareness of the leakage problem, but by 1979 the headlines still read, "Tank Leaks: Like the Common Cold, Nobody's Found a Cure."

By 1982, estimates based on petroleum industry studies indi-

Leak detection methods other than interstitial monitoring are based on the game of "catch me if you can," where the leaks we seek to catch are technologically elusive, and many UST operators are somewhat reluctant leak seekers. All too often, failure to take the game seriously results in a large release of product to the environment.

cated that there were 50,000 to 70,000 actively leaking USTs and that 30 percent of installed tanks were leaking, or would leak within the next few years. Finally, in 1984, the federal government stepped in, and the Subtitle I amendments to the Resource Conservation and Recovery Act became the law of the land. Four years later, EPA regulations governing USTs went into effect. By March of 1997, 329,000 confirmed releases had been reported.

The Leak Detection Conundrum

The federal UST program, established in 1988, is primarily a leak detection, not a leak prevention, program. While some emphasis is placed on leak prevention through corrosion protection, a regulatory program truly designed to prevent releases would include secondary containment for all storage tanks and piping. Secondary containment is the only UST technology that is forgiving of human error in the installation and operation of storage systems. This is because monitoring of secondary containment generally provides a significant delay between the onset of a leak and the release of product to the environment.

In a recent case in Maine, months and perhaps years elapsed between the time a pry bar was dropped to the bottom of a fiberglass double-walled tank, causing a small fracture in the primary tank, and the time a routine state inspection discovered that the interstitial monitoring probe had been disconnected. The tank interstitial space was half full of product, but there was no contamination associated with this inci-

dent and no cleanup was required.

Leak detection methods other than interstitial monitoring are based on the game of "catch me if you can," where the leaks we seek to catch are technologically elusive, and many UST operators are somewhat reluctant leak seekers. All too often, failure to take the game seriously results in a large release of product to the environment.

The Nagging Questions

I have two nagging questions about leak detection:

- ▶ Does leak detection work? (Is the technology up to the task of identifying leaks in a timely fashion?)
- ▶ Where leak detection fails, is it due to:
 - Inadequacy of the method?
 - Inadequate execution of the method by owner/operator?
 - Absence of leak detection altogether?

The anecdotal evidence with regard to whether leak detection reliably works is not convincing. For instance:

- ▶ I recently reviewed inventory records for a facility that indicated a loss rate of 20 percent of sales (nearly 3,000 gallons per month!) for 4 consecutive months. There was no response from anyone until product appeared in a neighboring basement.
- ▶ Data from California regarding the percentages of SIR analyses that reach pass/fail/inconclusive results indicate that there are significant inconsistencies among the methodologies used by SIR vendors.
- ▶ Although the state initially put great faith in groundwater and soil vapor monitoring for leak detection, Florida has found that these leak detection methods are severely compromised by pre-existing contamination and is moving toward universal secondary containment.
- ▶ I hear frequent reports of failed tank tightness tests that are routinely followed by passing results using another tank test method.
- ▶ Automatic tank gauges (ATGs) that conduct tests every night

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sound like a good idea, but the occasional failed test result that almost inevitably results introduces an element of confusion and doubt to the technology.

- A California survey of leak incidents indicated that a great many newly reported releases were located at facilities where no routine leak detection was conducted.

No Room For Complacency

We cannot afford to be complacent with regard to leak detection, because regulatory programs in almost all states permit single-walled tanks and piping to stay in the ground until a leak is detected. In my more cynical moments, it seems to me that this approach grants every storage system a "right to leak" and ensures that no storage system shall be removed before its time. The combination of single-walled storage technology with the "right to leak" replacement approach places a critical emphasis on effective leak detection.

It is important that leak detection be effective for a number of reasons:

- We are seeing the increasing use of reformulated gasoline containing methyl tertiary butyl ether (MTBE). Relative to other gasoline constituents, MTBE is very soluble in water, and its contamination plumes tend to travel farther and faster than BTEX plumes. MTBE is also more difficult and, thus, more expensive to remove from the environment than the traditional constituents of gasoline.
- As the tank population ages, the probability of leakage increases.
- The failure of leak detection can lead to serious threats to human health and the environment
- Reliance on ineffective leak detection can lull UST owners and regulators into a false sense of security
- Owners/operators may be wasting money on ineffective leak detection technology.

What's Working, What's Not?

So how can we find out what is really going on with leak detection? In my mind, the only true test of whether a storage system is tight or

leaking is to dig it up. Seeing is believing. If the tank excavation, piping trenches, and dispenser islands are clean, the storage system is tight. If there is contamination, then we can assume that either there is a leak or there have been leaks or sloppy housekeeping in the past.

Between now and the end of 1998, we have a great opportunity to make just such observations with respect to the large number of storage systems that will be removed in this time period. All of these systems should have some form of leak detection in place. The removal of these systems presents an ideal opportunity to compare the evidence of the excavation against the method of leak detection to see what stories can be told.

From an environmental protection perspective, today's tank population overall is probably the healthiest that it has ever been. But that is not to say that there are no more leaking USTs, nor that we will ever get to a point where all UST systems are perpetually tight.

Here's my proposal. Although effective leak detection is primarily of interest to the UST side of the program, enlist the help of those on the LUST side of the program who are often present at storage system removals (or even private sector tank removal or site assessment personnel if they are willing).

Develop a standard form to document tank removal results. Pertinent data might include:

- Is there contamination?
- If contamination is present, is the likely source overfilling, former USTs, past practices, or the system currently being removed?
- If the source of contamination appears to be the presently installed system:
 - Is the source of active leakage from tanks, or piping, or both?
 - Is the source of active leakage corrosion, leaking fittings, poor installation?

- What is the apparent magnitude of the release? (minor, moderate, gross)
- What method of leak detection was practiced?
- Was the method of leak detection practiced properly? (To answer this question, gather recent leak detection documentation, such as a few months of inventory, the most recent tightness test results, the last few months of ATG results, the last few months of SIR results.)

Gather the survey forms and supporting material and forward them to a central clearinghouse for analysis by knowledgeable people.

Such a survey would of course be imprecise because tank removals are hardly archeological digs, and the detective work needed to positively identify the source of leakage may not be feasible. In addition, the people completing the survey forms will have different points of view, levels of knowledge and experience, and powers of observation. Still, if enough data are gathered, some trends should emerge.

Tweaking USTs For The Next Millennium

Hopefully, such data should help us answer the question: Is leak detection working, and if not, why not? What we learn could help determine the direction of the UST program into the next millennium:

- Do we need a rule change or modification to eliminate certain types of leak detection, or to change how they are executed?
- Do we need to focus on education of owner/operators to promote the correct use of leak detection methods?
- Do we need increased enforcement to convince recalcitrant owners that leak detection is a must?

Are we doing any better in the realm of leak detection in 1997 than we were in 1913, 1941, 1951 or 1984? From an environmental protection perspective, today's tank population, overall, is probably the healthiest that it has ever been. But that is not to say that there are no more leaking USTs, nor that we will ever get to a

■ *continued on page 24*

Leak Prevention

New Protocol Available for Determining Applicability of SIR Methods for Manifolded Tanks

Manifolded tank systems represent a significant portion of the underground storage tank population. Many statistical inventory reconciliation (SIR) vendors feel that their systems are capable of detecting leaks from manifolded systems. The SIR Subcommittee of the National Work Group on Leak Detection Evaluations (NWGLDE), however, found that some SIR methods had been evaluated using data from manifolded systems, but that other SIR methods had been evaluated using data from non-manifolded systems.

The Environmental Protection Agency's (EPA's) *Standard Test Procedure for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods* (June 1990) provides no guidance on evaluating SIR performance on manifolded systems. For this reason, the NWGLDE formed an ad hoc committee to develop a modified protocol that establishes such guidelines. Members of this committee were Lamar Bradley, Beth DeHaas, Bill Faggart, Jerry Fiora, Mike Kadri, Aaron Rambach, and Ken Wilcox.

The result of this group's work is the *Protocol for Determining Applicability of SIR Methods For Manifolded Tanks And Determining Size Limitations*, developed to ensure that SIR methods can perform adequately on both single- and manifold-type tank systems. This protocol may not require any further analysis of data sets by a vendor. It will, however, require additional analysis of test results by an evaluator to determine if a SIR method performs adequately on both single and manifolded tank systems. It requires analysis of test results to determine if a method performs better on smaller tanks. It also explains how to calculate maximum tank size limits for single and manifolded tank systems.

This protocol was reviewed and approved by the NWGLDE on September 27, 1996. Please be aware that this is not an "EPA approved" protocol; it is a protocol addendum approved by the NWGLDE. The work group also voted to allow only systems that had been evaluated according to this protocol to be listed on its "List of Leak Detection Evaluations" as having been evaluated for manifolded systems using an approved protocol.

If you have questions about using this protocol, or including a SIR method on the "List of Leak Detection Evaluations," please call Lamar Bradley at 615-532-0945. ■

The Nationwide Status of Contractor Certification/Licensing Programs For UST/LUST-Related Work

Currently, 41 states have some kind of voluntary or mandatory contractor certification/licensing program. Of these states, 32 have mandatory programs and 9 have voluntary programs. Fifteen states require applicants to pass the International Fire Code Institute (IFCI) standardized electronic test in order to be certified/licensed. Some of these states have state-specific questions included with the IFCI exam. The balance of the states require applicants to pass a state test in order to be certified/licensed, except in South Carolina, where certification is based on experience. In addition to testing, Maine has requirements for training and the completion of six installations. Twenty-five states have some kind of continuing education/relicensing program. ■

"List of Leak Detection Evaluations For Underground Storage Tank Systems - Third Edition" Now Available

The National Work Group On Leak Detection Evaluations (NWGLDE) has released the third edition of its "List of Leak Detection Evaluations." The list contains a detailed summary of specifications, based on third-party evaluations for over 250 systems that detect leaks from USTs and their piping. The list is used to help select leak detection systems, obtain information about them, and determine their compliance or acceptability. Although maintained by a work group consisting of state and EPA members, the list is not a list of "approved" leak detection systems. Approval or acceptance of leak detection systems is the responsibility of the implementing agency, in most cases the state environmental agency.

This most recent edition is available in electronic form for free downloading from two electronic sources:

- The Internet: www.epa.gov/OUST/pubs/index.htm
- EPA's Cleanup Information Network (CLU-IN) electronic bulletin board. Access CLU-IN by modem at (301) 589-8366, with settings 8-N-1. Once in, join the UST/LUST Special Interest Group (#3), then go to File Directory 11 (Tanks and Piping). The files are LDLISTWD.EXE (Microsoft Word 6.0, original version) and LDLISTWP.EXE (WordPerfect 5.1), and both are over 2MB in size. Type the filename to expand these executable compressed files into useable form. For help in downloading, call Hal White at (703) 603-7177.

Copies of the *List of Leak Detection Evaluations for Underground Storage Tank Systems-Third Edition* (EPA 510-B-97-004) are also available through EPA's National Center for Environmental Publications and Information at (800) 490-9198. ■

Field Notes

from Bob Young, Industry Resource Liaison, the Petroleum Equipment Institute (PEI)

Contractor Associations: A Network of Experience

Since the early 1990s, petroleum equipment contractors have been establishing state associations to deal with underground storage tank issues and to work with environmental regulators on developing certification and licensing programs.

The concept or idea of state associations of and for petroleum equipment contractors is not new. The first petroleum equipment state contractor association was chartered in 1955 in New Jersey. In August 1991, only six state petroleum equipment contractor associations existed. Today, there are 22 state associations in Alabama, California, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Utah, Virginia, and Wisconsin. Efforts are underway to organize associations in Idaho, Michigan, Minnesota, Nevada, and South Carolina. Petroleum equipment contractor associations also exist in the provinces of Alberta and Manitoba, Canada, as well as London, England, and Victoria, Australia.

These organizations came into being for a variety of reasons. Some were formed to communicate to their members what was happening in the industry. A few were organized to provide management education for company owners. Others were created to provide technical training to member firms and their employees. A number of organizations took the education theme a step further and were established to deal with certification and licensing issues; some developed voluntary certification programs for their membership. And yes, a few organizations were formed to provide lobbying efforts, on behalf of their members, for issues related to the industry.

The successful state contractor associations in this industry are productive and prosperous because of the commitment and leadership of dedicated association members who are willing to serve as officers and directors. The success of these associations lies in the commitment of individuals to the cause—to promote high professional standards for individuals and companies in the petroleum equipment contracting industry.

The installation, maintenance, and service of petroleum storage systems is a specialized field that requires practical experience, combined with careful adherence to recognized good practices and procedures. Petroleum equipment contracting professionals have worked hard to provide financially sound and cost-effective installations, to improve the quality of workmanship, to ensure that petroleum storage systems are installed and maintained correctly, and, ultimately,

to contribute to a cleaner, safer environment.

Association Goals

Petroleum equipment contractor associations promote their profession with a code of ethics, and they address their purpose in the association's bylaws. Here is a sample of association objectives as stated in a set of bylaws:

- ▶ To advance the professional competence of members through the dissemination of information related to technical developments, regulations, training, and codes, all pertaining to the installation and maintenance of petroleum product facilities.
- ▶ To promote improvement in the environment, through programs calculated to reduce contamination of soil, groundwater, and air as a result of releases and emissions from petroleum product facilities.
- ▶ To elevate the professional level of persons engaged in the installation of petroleum product storage systems, through the development of voluntary or mandatory licensing, or certification requirements for contracts engaged in such work.
- ▶ To encourage the adoption of laws and regulations that recognize the environmental importance of responsible tank-system contractors.
- ▶ To enhance the performance of member firms, through the development of a code of ethics for companies engaged in the installation and maintenance of petroleum product facilities, and through encouragement of adherence to the code.
- ▶ To cooperate with regulatory agencies and petroleum marketers in the preparation and refinement of rules related to the safety, accuracy, and environmental soundness of facilities installed within the state for the storage, measurement, transport, and dispensing of petroleum products.
- ▶ To promote, in all lawful ways commensurate with public interest, the business development, and economic welfare of members of the association.

By setting professional standards, both customers and end-users stand to benefit. A contractor who belongs to an industry-related organization may be preferred by a customer over a nonmember because he or she is typically better trained, more qualified, more knowledgeable, and can generally better serve a whole range of clients—service stations, c-stores, major oil companies, private and government fleets, and the public.

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Field Notes *continued*

Contractor associations stay on the cutting edge of new environmental regulations that might be introduced. Some states have continuing education requirements for each licensing renewal period. Associations are able to provide technical training and education in the latest technologies and procedures. A number of associations conduct quarterly educational seminars for licensed or certified petroleum equipment contractors.

Networking and Communication

One of the most vital services state petroleum contractor associations provide to their members is communication. Considered by most members as the most important function of the association, effective communication makes for a successful association. Members of petroleum equipment contractor associations are busy and rely on the association to keep them informed of pressing legislative issues, program availability, and many industry-related topics. Associations attempt to keep up with the communications technology curve and assist members by dealing with the information overload. Organizations provide timely and effective communications through newsletters, data bulletins, e-mail, correspondence, faxes, and phone calls.

While association members oftentimes compete with one another, they also benefit from the opportunity to network with each other within the association. They give and get feedback, exchange ideas, share product information and general business tips with others in the field.

With 22 petroleum equipment contractor associations in the country, a national contractor association network has developed under the auspices of the Petroleum Equipment Institute (PEI). PEI provides the associations with training opportunities and brings together association staff twice a year to share ideas, develop programs, discuss problems, and set direction for their various organizations. As it usually turns out, problems in the industry tend to not be unique.

Through the network, if association members need help or information from their organization, their staff person now has any number of other avenues of resources to turn to for assistance. This network extends to the environmental community as well. Association members and staff stand ready and are available to serve as consultants and educational seminar leaders to environmental regulators, code administrators, and fire officials.

PEI's Role

The Petroleum Equipment Institute (PEI) has been actively involved with petroleum equipment contrac-

tor associations for about 7 years, providing assistance where needed. PEI has been instrumental in organizing 14 associations and is currently working with 4 more states to form organizations. Petroleum equipment contractor associations provide services and fill a niche that PEI cannot address.

When new associations are in the process of forming, PEI assists them with determining and setting up their organizational structure. PEI provides them with sample bylaws, agenda, membership applications, codes of ethics, budgets, mission statements, and antitrust policy statements. Membership rosters, dues and budgets, meetings, officers and directors, committees, and a number of operational considerations are all addressed.

PEI provides assistance in promoting and organizing initial association meetings and serves as a resource for planning meetings and agenda topics. PEI staff and officers also serve as presenters at association meetings. In the past, PEI has provided associations assistance with executive director searches and association administration.

Every year at Convex, PEI's trade show, PEI holds a petroleum equipment contractor association luncheon for officers and staff. Staff training is also provided annually at the petroleum equipment contractor association workshop. PEI publishes notices of education seminars and meetings in its TulsaLetter and provides resources for education and training. PEI regularly notifies state contractor associations of regulatory updates.

Beyond the '98 Deadline?

Once the December 1998 deadline has passed, UST work is likely to slack off and many organizations have already begun looking to the future. It is probably safe to say, however, that UST work will continue at a certain level as long as there are petroleum storage tanks. Also, with the possible emergence of aboveground storage tank (AST) regulations, a number of associations have begun providing AST education and training programs. There may be more vapor recovery work down the line, so associations continue to monitor the regulations and prepare themselves to provide additional technical training. Whatever the future brings for the industry, the petroleum equipment contractor associations will be there providing benefits and services to their members. ■

As PEI Industry Resource Liaison, Bob Young provides assistance and resources to petroleum equipment contractor associations throughout the U.S., as well as Canada, Australia, and England. For more information about contractor associations, contact Bob at (918) 494-9696.

Leak Prevention

Oh...Yeah...The Chemical Tanks

Chemical Bulk Storage à la New York State

by Nick Kolak

Like it or not, chemical products play a fairly hefty role in meeting the demands of our society. The chemical industry provides the fundamental building blocks for countless products that we use on a daily basis. The bulk storage of these varied chemical substances is an integral part of this modern-day picture.

As New York State has grown, the volume of chemical production, bulk storage, and transportation has grown correspondingly. Unfortunately, this increased volume is often accompanied by emissions during processing, leaks and spills during storage, spills during transportation and use, and accidents during processing. Such releases pose a potential risk to human health and the environment.

Because of the significantly greater volume of petroleum versus chemical products stored nationwide, the lion's share (in terms of staffing and funding) of government regulatory and corrective action attention has been devoted to petroleum storage programs. But as the '98 deadline draws closer, let's not forget that the chemical USTs are included.

Like petroleum USTs, chemical USTs are required by federal regulations to have corrosion protection and spill and overfill prevention devices by December 1998. Federal regulations for '98 also require that chemical USTs have secondary containment with a monitoring leak detection system in the interstitial zone that can indicate the presence of a leak in the confined space between the first and second wall.

What chemicals are included in the federal regulations? Approximately 1,000 chemicals are designated as "hazardous" and "extremely hazardous" under the Comprehensive Environmental Response, Compensation, and Liability

Act of 1980, better known as CERCLA or "Superfund." The UST regulations apply to the same hazardous chemicals identified by CERCLA, except those listed as hazardous wastes, which are already regulated under Subtitle C of the Resource Conservation and Recovery Act. There are also a number of other federal laws, as well as national codes and standards, that address hazardous substances.

New York's Chemical Bulk Storage program deals with both the underground and the aboveground storage of chemicals. This article focuses on chemical storage issues above and below ground.

Some regulatory folks would argue that because there are so few chemical tanks relative to the staggering numbers of petroleum storage tanks, you've got to choose your battles (i.e., focus more on petroleum tanks than chemical tanks). Yet, each year, thousands of people in the United States are exposed to hazardous chemicals that are released to the environment as a result of chemical-related accidents. Almost all accidents are preventable

Why Regulate Chemical Tanks?

On April 8, 1997, a 4,700-gallon delivery of hydrochloric acid to a 6,000-gallon fiberglass receiving tank was underway when the receiving tank became over-pressurized; the top 4 feet of the tank blew off, and the remainder of the tank ruptured. Secondary containment subsequently failed, and the acid flowed

into the street and into storm drains. The accident occurred shortly after 9:00 a.m. during rush-hour traffic. Forty-three people were treated at local area hospitals. Investigations into the cause of this accident are continuing. Although the tank was vented to a scrubber, it is unclear what caused the over-pressurization. With an additional emergency vent and proper inspection procedures during transfer, this accident could have been avoided.

On April 4, 1997, a school custodian inadvertently directed the delivery of chlorine gas into a tank containing hydrochloric acid. Both chemicals are used to maintain the water quality in the school's swimming pool. The piping was not labeled. Fumes of acid and chlorine gas were released inside the school, forcing the evacuation of 1,450 students and faculty. Fourteen people were treated at the local hospital. Had the piping been labeled, the accident would likely not have occurred.

As a result of accidents similar to those just described, it became clear in New York by the mid-1980s, that the state needed regulations for the storage and handling of chemicals in order to reduce the number of spills, protect the health and safety of the public, reduce the growing costs associated with remedial cleanup, and minimize the impact of chemical releases on the state's natural resources. To appreciate the magnitude of this problem, 2,839 hazardous material spills were reported to the New York State Department of Environmental Conservation (NYSDEC) from July 1988 through March 1997.

Here in New York, public awareness of the environmental, health, and safety hazards associated with the use of chemicals has grown along with the growth of the chemical industry. Incidents such as the two events cited above have gone a

■ continued on page 8

■ Chemical Tanks *from page 7*

long way to sensitize the public to the environmental damage and health effects that are caused by chemical spills

Some regulatory folks would argue that because there are so few chemical tanks relative to the staggering numbers of petroleum storage tanks, you've got to choose your battles (i.e., focus more on petroleum tanks than chemical tanks). Yet, each year, thousands of people in the United States are exposed to hazardous chemicals that are released to the environment as a result of chemical-related accidents. Almost all accidents are preventable—a double-walled tank with interstitial monitoring, a properly labeled tank, a properly attended delivery, or an emergency vent in the right place at the right time could make all the difference in how we co-exist with the chemicals in our lives. This is why New York State regulates chemical tanks.

To appreciate the magnitude of this problem, 2,839 hazardous material spills were reported to the New York State Department of Environmental Conservation (NYSDEC) from July 1988 through March 1997.

Chemical Idiosyncrasies

Chemicals have idiosyncrasies that regulators as well as community health and safety officials need to recognize and consider when dealing with the storage, use, and transport of chemicals in bulk. Many substances are hazardous because of their specific physical properties. In an industrial setting, considerations associated with chemical storage and operations center on the physical and chemical properties of the material used. These properties determine how the materials behave—how they react or decompose, mix or remain separate, release or absorb heat, change phase, and so forth.

Flammable liquids, for example, will explode or burn only when their vapors are mixed with oxygen in the correct proportions in the atmosphere, and then only when



Firefighters undergo decontamination after entering the area of a recent chlorine leak in New York State.

they are in the presence of a source of ignition. Other substances are hazardous to human health because of their chemical, rather than physical properties. Highly caustic or acidic substances, for example, can injure or destroy human tissue. Some chemicals have the potential to affect human health and cause cancer.

There are several parameters associated with the hazardous nature of a substance that factor into how it is stored and handled. Some of these factors are presented in the sidebar on page 9.

UST/LUST regulators have become quite familiar with the properties of petroleum products (e.g., gasoline, fuel oil, bunker oil)—they're flammable, they possess similar volatilities, and they're relatively insoluble in water. These similar physical and chemical properties make it easier to design appropriate regulations for the bulk storage of petroleum products and, for that matter, to deal with the cleanup should a release occur.

Designing regulations for the bulk storage of chemicals is more complicated and presents a greater challenge. As noted in the parameters listed on page 9, some chemicals float on water, much like petroleum derivatives. Others are more dense than water and sink to the bottom, a fact which can significantly jack up the cost of remediating a chemical release, relative to a petroleum release. Chemicals that are soluble in

water pose an even greater threat to drinking water; they require society to do everything possible to protect aquifers from contamination. When we look at relative toxicities, we find that many chemicals are significantly more toxic than are petroleum products.

New York Tackles Chemical Storage

Recognizing the complex nature of chemical tanks, New York State, nevertheless, bit the chemical bulk storage regulatory bullet. In 1986 the state legislature passed the Hazardous Substance Bulk Storage Act, which required NYSDEC to establish a program for preventing the release of chemicals to the environment. On July 15, 1988 NYSDEC adopted its Chemical Bulk Storage (CBS) Regulations (Phase I) to implement this law.

Phase I sets forth a list of over 1,000 hazardous substances to be regulated and requires the registration of AST and UST systems that store any of these hazardous substances, either singularly or in combination. The regulations also require the appropriate parties to notify the NYSDEC of any hazardous substance spills and to take prompt remedial action to protect human health and the environment in the event of a release.

Phase II of the CBS program was adopted on August 11, 1994. This phase established minimum

requirements and schedules for the design, construction, installation, operation, maintenance, repair, monitoring, testing, and inspection of storage facilities.

The CBS regulations consist of five parts (Parts 595-599). Part 595 (Reporting Releases) requires owners, operators, contractors, and others to report the following types of releases to the environment:

- ▶ One-time reporting of continuous and stable releases;
- ▶ Reporting of releases exceeding the reportable quantities identified in Part 597; and
- ▶ Reporting of releases even if the release is less than the reportable

quantity, if the substance released could result in a fire or explosion or pose a health risk to adjacent parties.

This regulation applies to all releases, including releases from chemical process tanks, certain transportation accidents, chemical fires, explosions, and nonregistered facilities.

Part 596 (Registration) has been in effect since 1988 and requires the registration of ASTs with a capacity of 185 gallons or more and any size UST. This section addresses registration fees and prohibits the delivery of a chemical to an unregistered tank.

Part 597 (List of Hazardous Substances) contains a list of over

1,000 hazardous substances and their reportable quantities. NYSDEC is required by state law to regulate all substances which are regulated by CERCLA, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and the federal Toxic Substances Control Act (TSCA), as well as other chemicals known to be hazardous.

Part 598 defines upgrade requirements for USTs with a deadline of December 22, 1998, and upgrade requirements for ASTs with a deadline of December 22, 1999. Part 599, which began February 11, 1995, presents the standards for all new and substantially modified facilities.

In New York, owner/operators of chemical or petroleum USTs need to know three important items to satisfy the requirements for their deadlines:

- ▶ All USTs must be corrosion resistant;
- ▶ All USTs must have a double wall or a liner; and
- ▶ All USTs must be upgraded to satisfy spill/overfill requirements.

While owners/operators of aboveground storage tanks (ASTs) in many other states may not be regulated, New York State regulates ASTs to ensure proper management. New York requires that AST facilities have the following:

- ▶ A Spill Prevention Report
- ▶ Secondary containment for ASTs and transfer stations
- ▶ Inspection schedules
- ▶ Emergency venting
- ▶ Labeling of tanks and piping
- ▶ Storage of nonstationary tanks in dedicated areas.

Our CBS regulations require emergency venting and a rigid inspection schedule. Effective August 11, 1996, the regulations also require that a Spill Prevention Report (SPR) be developed and maintained at the storage facility. The SPR must be updated at least once per year and immediately after a major release or major modification. Among other things, the SPR must contain a copy of the registration application and certificate, a site map, an assessment of releases over the previous 5 years, a status report on compliance, and a spill response plan.

■ continued on page 10

Chemical Factors Used in Designing Bulk Storage and Piping Systems, Secondary Containment, and Delivery Systems

- **Vapor density ratio** - The relative weight of a vapor compared with an equal volume of air under the same conditions.
- **Specific gravity** - The relative weight of a certain volume of liquid or solid compared with an equal volume of water.
- **Water solubility** - The proportion of a material that dissolves in water, usually at room temperature.
- **Vapor pressure** - The pressure of a vapor at the specific temperature where the vapor is in equilibrium with its liquid or solid form. Vapor pressure is also a measure of a substance's volatility.
- **Boiling point** - The temperature at which the vapor pressure of a substance is equal to atmospheric pressure.
- **Particle size** - The size of the portions into which a substance is divided. This property has a bearing on the stability of the substance in the environment.
- **Viscosity** - The measure of a liquid's resistance to flow due to its internal friction.
- **Rate of evaporation** - The rate at which a liquid will convert to a vapor at a specific temperature and pressure.
- **Melting point** - The temperature at which a solid changes to a liquid at atmospheric pressure.
- **Toxicity** - The ability of a substance to produce an adverse effect on a biological system.
- **pH** - The acidity or alkalinity of an aqueous solution.
- **Corrosivity** - The measure of a metal's ability to react with moisture, usually water.
- **Flash point** - The lowest temperature at which a flammable liquid or solid will give off enough vapors to support combustion.
- **Ignition temperature** - The lowest known temperature at which a gas or the vapor from a liquid or solid—in a closed or nearly closed container—will self-ignite without the help of a source of ignition.
- **Flammable limits** - The lowest and highest proportions of a vapor or gas relative to the air that will burn. ■

■ Chemical Tanks *from page 9*

The SPR is a management plan that contains useful information for both preventing and responding to a spill. The history of leaks and spills at a facility can provide important information for preventing future occurrences. For example, when an emergency occurs, telephone numbers are needed quickly so that neighbors and the proper authorities can be notified. One purpose of the document is to provide a sound course of action for employees and emergency responders.

Owner/operators are required to develop evacuation plans and train all staff periodically so that they are prepared for such emergencies. With a properly defined SPR in place, a facility can expect to minimize/eliminate injury, loss of life, hospitalization, the extent of subsequent remediation, and liability.

As of March 31, 1996, New York State's CBS program had 1,975 registered facilities. These facilities accounted for 6,644 in-service ASTs and USTs, representing a storage capacity of 58,122,250 gallons for 196 unique chemicals. The chemicals stored in largest volume are sodium hydroxide, methanol, sulfuric acid,

sodium hypochlorite, hydrochloric acid, phenol, ammonia, aluminum sulfate, xylene, and toluene; they account for a combined storage capacity of 36,538,000 gallons.

New York State's CBS regulatory program is fairly flexible, particularly with respect to upgrade requirements for ASTs and USTs. Tank owners may choose to follow generally accepted industry consensus standards, or obtain NYSDEC approval to follow equivalent practices. Variances are also allowed under the regulations.

The state is making every effort to work with industry to find acceptable solutions to the required upgrades and expects these solutions to be protective of human health and the environment. NYSDEC is continuing its efforts to remind facility owners of their obligations to satisfy the regulatory upgrade requirements.

This June, a compliance initiative got underway. Letters have been sent to all registered UST facilities in the state, advising them of the December 1998 deadline. Attached to the letter is a copy of EPA's brochure, *Don't Wait Until 1998*. Also attached is a computerized printout of the state's information on the facility's tank and piping systems, based

on registrations. The facility is required to review this information, which will be used to determine compliance.

Getting The Word Out Via Internet

NYDEC has created a web site (www.dec.state.ny.us), which will provide the public and industry with the opportunity for instant access to various regulations, technical guidance documents, brochures, and notices. The Bulk Storage program is preparing a web page which will provide the following information:

- ▶ An overview of the program and the regulations for each subsection: Petroleum Bulk Storage, Chemical Bulk Storage, and Major Oil Storage Facility.
- ▶ Federal UST regulations.
- ▶ Q & As concerning all aspects of storage tanks.
- ▶ Technical guidance publications available from the program.
- ▶ Regional NYSDEC contacts. ■

Nick Kolak is responsible for implementing the NYSDEC Chemical Bulk Storage program.

Leak Prevention

Georgia Takes An Innovative Approach to Managing and Financing Compliance and Corrective Action at State-Owned UST Facilities

by J. Robert Wiggins, Jr. and Jill Stuckey

The State of Georgia is taking an innovative approach to managing and financing compliance and corrective action at state-owned UST sites. The tank management and corrective action strategies that have been put in place are already saving the state money, and the financial burden for UST capital costs (i.e., tank upgrades, replacements, and removals) is being spread over a 20-year period.

In 1993, staffers in the Governor's office began noticing an influx of requests from state agencies for large sums of money for UST-related work. Because of the number of requests, the Governor's staff deemed it prudent to review the state's UST management practices and determine how each agency intended to manage its tank upgrade work. This review process involved representatives from all state agencies and from the UST Management Program of the state's Environmental Protection Division (EPD).

The EPD records showed that there were almost 1,000 UST sites owned by 18 different state agencies. Over 85 percent of the sites had not yet been upgraded or closed. The EPD had been notified about product releases at many of these sites, but little site assessment work had been undertaken. The agencies had been relying on guidance from consultants, and both the guidance and the consultants varied widely from agency to agency. As a result, the reviewers discovered a glaring lack of consistency in new systems stan-

dards, as well as a lack of cost-effective compliance with UST regulations.

As representatives from EPD's UST Program, we (the authors) recognized that a coordinated approach was essential and proposed to the Governor's staff that a separate group be established to oversee and manage the work at all state-owned UST sites. We reasoned that such a group could achieve three crucial objectives:

- ▶ Ranking of all sites by priority/need, regardless of agency ownership;
- ▶ Development of consistent management practices, systems design, and assessment and/or remediation work for all sites; and
- ▶ Realization of major cost savings by instituting new methods of supplying fuel to the state fleet and by finding new, more efficient ways to assess sites for potential environmental impact.

Key to this proposal was the establishment of a new management group which would oversee and implement an all-agency UST management plan. Funding for all UST-related work would now be channeled to this central UST management group.

The proposal was presented to the Governor in late 1994. He agreed to it and included the plan in his FY-96 budget. In early 1995, the plan and budget were submitted to the General Assembly. The General Assembly concurred and assigned the new UST Management Group to the Georgia Environmental Facilities Authority (GEFA), as of July 1995. The Assembly also approved the sale of \$5 million in bonds (amortized over a 20-year period) to fund replacement, closure, and remediation activities at state-owned UST sites. An additional \$5.6 million was made available in July 1996. Another \$5 million bond sale will be conducted in July 1997; more funds will be provided in future years, as needed.

The UST Management Group's first order of business centered on resolving two key questions: What was the best way to provide fuel to the state's fleet of over 22,000 vehicles? and How could the state achieve environmental compliance at

its 1,000 sites without spending vast sums of money?

Fueling the Fleet

Prior to the establishment of the UST Management Group, each state agency had assumed that most tanks would be replaced on a one-for-one basis. If so, however, the cost would have approached \$50 million. A quick survey showed us that almost 80 percent of the state's vehicle fueling sites pumped less than 2,000 gallons of fuel each month. This stark reality lead us to conclude that investment in new systems at sites with such small monthly throughput could not be justified! So far, we have identified about 650 fueling locations. By the time our program is complete, Georgia's UST sites will have been whittled down to less than 100.

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But before we could begin closure of these tanks, we had to find a way to provide fuel to the state's 22,000 vehicles. Consideration had already been given to creating a privately administered credit card system for state fuel purchases but without any particular urgency. Those of us at the UST Management Group realized that such a system was now essential. We discussed the situation with the Governor's staff and urgently recommended that the development of the private credit card for fuel purchases be given very high priority. (Coincidentally, this recommendation came as the Governor was working to privatize more and more state services and sourcing of supplies.) With all parties in agreement, work on the credit card system moved into high gear.

The development of the credit card system has been supported by all state agencies. The old gasoline

purchasing system was cumbersome and could not provide timely management information. In developing the new credit card system, we decided that it must be set up as a true "one-card" system. Thus, the private vendor who will support the system must be able to integrate, via a single credit card per vehicle, data from retail fuel purchases with data from fuel obtained at state-owned facilities. Using special computer systems and fleet management software, the new system will enable a driver to use the same credit card to obtain fuel from either a private vendor or a state facility, thereby creating a single tracking and reporting system for all fuel transactions. As of this writing, vendors are submitting proposals for the system; it is to be operational by late 1997, a year before the 1998 UST upgrade deadline.

Meanwhile, we began work to bring the remaining sites up to the new standards. We established basic design elements and developed and standardized engineering drawings and specifications. The same designs are used over and over, with some tailoring to site-specific and/or special operating situations. Some projects have been completed and more are being initiated each month. This approach of reducing the tank population, standardizing designs, and converting most facilities to the new credit card system has reduced the state's capital cost for UST upgrades and replacements from about \$50 million to about \$15 million—a 70-percent reduction in required funds!

A Risk-Based Approach to Environmental Assessment

The second part of our program was just as crucial as the tank management aspect. We needed to find a cost-effective approach for ensuring that the state achieved compliance with environmental standards. Our traditional approach toward LUST site assessment—"zero tolerance" and "chasing the plume"—would require upwards of \$50 million and many years to conclude all work. Because the state does not tap into the State UST Trust Fund to pay for cleanups, the required cleanup funds would have to come from General Obligation Bonds, which, in turn,

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■ Georgia from page 11

would be paid back with General Revenue. Because all government units have more demand for funds than tax revenue, providing these amounts would come at the expense of other services and programs.

In evaluating our site assessment options, we took a look at the state's general resource/land use picture. Over 60 percent of Georgia's drinking water comes from surface sources—streams and/or impoundments. Over 40 percent of Georgia's land surface is the Piedmont, a topography that consists of tight soils and water tables greater than 25 feet below surface. The next 50 percent of the state's land surface is underlain by a surficial aquifer—although shallow-bore drinking water wells are quite common in this area, the state UST sites are typically long distances from living areas. We reasoned that inasmuch as over 80 percent of the state's UST sites consisted of small tanks less than 2,000 gallons in size, each pumping low monthly volumes, the risk of a large release at any one of these sites seemed very low. The combination of these facts led us to conclude that a majority of the state facilities should pose insignificant contamination risk.

In order to confirm our intuitive conclusion we had to develop a new methodology that would satisfy the environmental assessment requirements, yet cost much less than the old process. Given the limits on available funds, we knew that our corrective action efforts should be directed at the highest risk sites first. Since Georgia's Environmental Protection Division has long focused on preventing contamination of drinking water wells, our first priority was to identify those sites that could impact known and active wells.

We devised a three-step approach to satisfy and resolve our needs. First, we commissioned a physical survey of all UST facilities, accumulating site-specific information on such considerations as water receptors, preferential pathways, uses of adjoining property, building construction, soil conditions, and the location of the USTs on the site. Next, we commissioned the development of a risk-based model that would

This approach of reducing the tank population, standardizing designs, and converting most facilities to the new credit card system has reduced the state's capital cost for UST upgrades and replacements from about \$50 million to about \$15 million—a 70-percent reduction in required funds!

integrate the predictive abilities of soils transport models, water transport models, and gasoline vapor transport models. Last, we had the developer of the model input site-specific information to create a relative ranking of risk in order to identify which sites to address first.

The site survey, the first step, was bid on a fixed-cost basis. The information we required had to be presented both on U.S. Geological Survey topographical maps and on site-specific drawings. This scheme not only provided all of the site data, it also created the foundation for the next steps. This work was done for about \$200 per site and was completed in less than 120 days!

Our Forecasting Tool

The second step, the development of a integrated risk-based model, is the key component of Georgia's program. We had observed that most UST sites have some degree of contamination (from overfilling usually), yet probably pose very little risk to drinking waters. We also realized that, in most cases, whatever contamination was present in the tank excavation would diminish in quantity as it moved through the soil and/or to the ground water. Since benzene is the most serious health-based constituent of petroleum products, we felt that the development of a means to forecast its potential impact on drinking water wells was paramount.

The contractor selected to develop the model was charged with creating a model that would literally integrate predicted movement of contaminants in soil and in water so that Georgia could forecast the timing and impact of benzene contami-

nation for a given well. The contractor was asked to evaluate and select from published, peer-reviewed fate and transport models and to validate them with respect to state sites that had already been extensively investigated. He was asked to regionalize the sites based on topography and soils susceptibility. He was asked to run sufficient trials of the model to identify which of the many variables would need to be represented as site-specific data. Finally, he was asked to make the new model dynamic to reflect relative risk as new data are input.

This work resulted in a new forecasting tool that takes site-specific data (e.g., direction and distance to receptors, probable depth to groundwater, soils conditions [including grain-size analysis], soil contamination tests results [benzene], preferential pathways, and proximity to buildings) to predict the following:

- ▶ If, when, and at what levels benzene would move through soils to groundwater,
- ▶ If, when, and at what levels benzene would migrate through groundwater to someone's well, and
- ▶ Whether gasoline vapors could accumulate in enclosed spaces (basements, sewers).

Because each component of the model feeds data into the other component, any change in one variable automatically triggers a recalculation for the entire model.

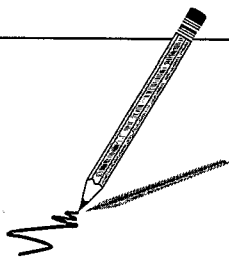
Ranking the Risks

The contractor input the data from all 1,000 sites to create a relative ranking. The output yielded a raw numerical score that ranged from zero to over 200,000 points. The first ranking was based only on the site surveys. As such, it was a valid assessment of the potential risk at all sites. Sites with very low scores could be expected to pose no risk, regardless of the amount of product released. Sites with high scores could pose big problems even if only small amounts of product were lost.

The model is truly dynamic. As tanks are removed, and soil contami-

■ *continued on page 24*

Qs
and
As



Where UST regulations are concerned, questions do pop up. No matter how obscure some of these questions may be, they merit exploration. No matter how obscure the question, someone out there needs an answer. Our answers derive from a carefully considered interpretation of the federal rule, based on EPA guidance. Keep in mind, individual state requirements may differ from federal requirements. Your questions and comments are welcome.

A Q & A in the last issue of *LUSTLine* addressed the length of time existing USTs can use the leak detection method that combines monthly inventory with tank tightness testing every 5 years. For convenience, we will call this leak detection method the "combination method." What follows is a clarification of this question based on recent EPA information.

Q. When can you start using the combination method as an approved leak detection method?

A. The federal regulations state that the combination method satisfies federal leak detection requirements only when applied to an UST system that meets the performance standards for new UST systems or upgraded UST systems. Basically, these standards require the UST system to have spill and overfill protection and corrosion protection for tanks and piping.

Q. How long can an UST system use the combination method?

A. Federal regulations state that the combination method can be used for a maximum of 10 years after the tank is installed or upgraded with corrosion protection. Note that this time period is based on the compliance status of the tank only, not the entire UST system. (In the last issue of *LUSTLine*, we incorrectly stated that an "extension is granted" for USTs to use the combination method; in fact, the period during which the combination method is valid is not an "extension" and does not need to be "granted" by an implementing agency.)

This information is basically consistent with EPA materials circulated to date and should create no confusion as long as: 1) the tank and the rest of the UST system are

upgraded at the same time, or 2) the tank has corrosion protection added after the rest of the system meets upgrade standards. In these cases, USTs can use the combined method for 10 years after the tank has corrosion protection, or December 1998, whichever date is later.

But what about the smaller subset of existing USTs in which the tank has corrosion protection *before* the rest of the UST system meets upgrade standards? In some of these cases, the combined method may not be valid for more than a few years. As noted above, the federal regulations require that the entire system be upgraded before the combination method can meet the federal leak detection requirements. However, federal regulations also establish an ending date for the period during which this combination method is valid. The ending date established is 10 years after the date the tank has corrosion protection (or December 1998, whichever is later). Since the period of validity cannot begin until the whole system has met performance standards for new or upgraded USTs, the period of validity is less than 10 years only in these cases where the tank has been protected from corrosion before the rest of the UST system meets the upgrade standards.

The sample cases which follow illustrate three basic possibilities:

- **Tank and other UST system components are all upgraded at the same time.**

For example, a bare steel tank installed in 1980 is subsequently, in 1997, assessed by means of an internal inspection and is upgraded with corrosion protection, piping upgrades, and spill and overfill protection. This UST system can use the combination method until 2007, which is 10 years following the date of tank upgrade.

- **Tank has corrosion protection added after the rest of the UST system meets upgrade standards.**

For example, a bare steel tank installed in 1980 adds piping upgrades and spill and overfill protection in 1993, but the tank is not upgraded with corrosion protection until 1997. This UST system can use the combination method until 2007, which is 10 years following the date the tank is upgraded with corrosion protection.

- **Tank has corrosion protection before the rest of the UST system meets upgrade standards.**

For example, a bare steel tank is upgraded with corrosion protection in 1988 (or the tank is made of noncorrodible material and installed in 1988), but the piping, spill, and overfill upgrades are not added until 1995. This would mean that the UST system could start using the combination method to meet federal leak detection requirements only in 1995 (when the full system was upgraded) and could use the combined method only until 1998 (the date which is 10 years after the tank has corrosion protection). In this example, the UST could use the combined method to meet federal leak detection requirements for 3 years (from 1995 to 1998). After 1998, the UST in this example would need to begin using a monthly monitoring method.

Readers should be aware that these qualifications apply also to USTs ranging in capacity from 1,001 to 2,000 gallons that use a variant of this combined method. These small USTs can use a combination method of manual tank gauging with tightness testing every 5 years with the same qualifications as noted above

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■ Qs and As from page 13

for USTs using the method that combines inventory control and tightness testing.

In all cases, when the combination method can no longer be used, monthly monitoring is required by the federal leak detection regulations. Approved monthly monitoring methods are manual tank gauging (only for tanks 1,000 gallons or smaller), automatic tank gauging, statistical inventory reconciliation, vapor monitoring, groundwater monitoring, interstitial monitoring, and other methods approved by the implementing agency as equally effective in detecting leaks

Q. Owners/operators of new and existing USTs are required to perform release detection for spills and leaks of regulated substances (40 CFR 280.40(a)). For some USTs, one of the options available for meeting the release detection requirements combines tank

tightness testing at specified intervals with monthly inventory control. Monthly inventory control requires owners/operators to perform certain activities in order to detect a release of at least 1.0 percent of flow-through plus 130 gallons on a monthly basis. The activities required include recording measurements of the amount of product delivered, dispensed, and stored in the tank each operating day. If a UST is storing a regulated substance that is added or removed only a few times a month, or not at all, is the owner/operator required to gauge the tank every day the regulated substance is in the tank, or just the days during which the regulated substance is added or removed?

A.

The owner/operator is required to conduct inventory control measurements each day the regulated substance is added or removed, and at least monthly. The definition of each operating day for purposes of

monthly inventory control requires recording tank measurements only on those days that a regulated substance is added or removed. However, the owner/operator, in order to meet the inventory control standard on a monthly basis, must also record and reconcile delivery, dispensing, and inventory measurements at least once a month. For example, if a 4,000 gallon diesel fuel UST on a farm has no deliveries and dispenses no fuel for a month, then the farm is required only to record the amount of fuel in the tank (and compare this value with the standard) on a monthly basis. Note, however, that after 3 months of inactivity, closure requirements may apply. Also note that inventory control is, for each tank, part of a temporary release detection option. (See the answer to the question above.) Request EPA's *Doing Inventory Control Right: For Underground Storage Tanks* (EPA 510-B-93-004) for instructions and optional forms.

Leak Prevention

Petroleum Marketers Promote P2 With Farm Customers

By Liz Nevers

Partnerships between the public and private sectors can be very effective. A recent Farm*A*Syst pollution prevention (P2) initiative targeted gasoline and diesel storage and use on farms. With the goal of keeping fuel out of soils, surface water, and groundwater, a group of public-private partners worked together to provide farmers with special information packets, to sponsor educational displays at three Wisconsin county fairs, and to present several on-farm workshops.

Funded in part by an EPA grant awarded to the National Farm*A*Syst Program, the partnership included two Wisconsin petroleum retailers, Danco Prairie FS Co-op and Haskins Gas and Oils; project members from the national and state Farm*A*Syst programs; state petroleum organizations; University of Wisconsin-Extension agents and specialists; and a state regulatory agency.

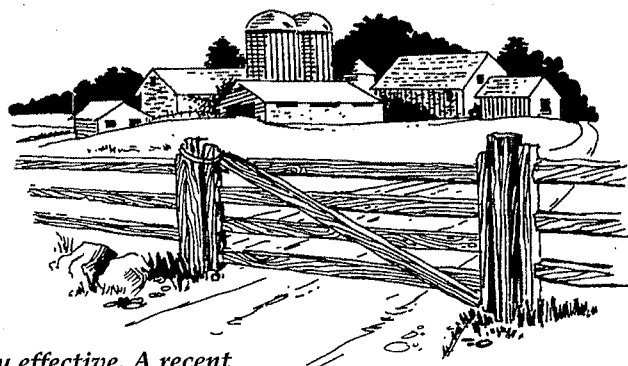
Wisconsin's tank program regulates all underground and above-ground storage tanks, including

tanks exempted from the federal regulations (these tanks have an upgrade deadline of May 1, 2001). Getting the word out to this vast regulated community was an important priority.

"At the Wisconsin Department of Commerce, we like to educate before enforcement," says LeRoy Nordmeyer, aboveground/underground storage tank specialist. "This [P2] project brought awareness to oil jobbers [marketers] and tank installers that they need to take a leading role in education. It is doing

volumes of work without dragging people into court—which is not our goal."

Dane County/University of Wisconsin-Extension Natural Resource agent, Mindy Habecker, also believes education is important. "Underground tanks and fuel tanks are an issue in Dane County. I get phone calls on a regular basis from farmers who have an underground tank that they want to remove," she says. "With the phasing in of a new—fairly confusing and complex—set of regulations, I felt it was a critical



issue. A recent Department of Commerce survey found that more than 90 percent of Wisconsin's farm fuel tanks are not meeting state code."

Farm Petroleum Tank Information Packet

Since members of the partnership team agreed that farmers lack information, a packet was devised to:

- ▶ Create awareness of the pollution and fire risks and their impacts
- ▶ Educate farmers about state codes
- ▶ Give farmers directions and tools to prevent pollution
- ▶ Provide information on additional assistance and services

Rather than creating all new publications, each member organization supplied relevant materials. The team decided to make the packet a working file folder with recordkeeping functions. The retailers also promoted special tank-upgrade equipment, such as automatic shut-off nozzles, and included coupons in the information packet to encourage farmers to purchase the equipment.

The retailers' fuel managers and the fuel delivery drivers participated in training sessions to understand the materials and their role in the project. The drivers, for example, had the job of delivering the information packets during their regular farm refueling stops and promoting other activities. Each packet contains:

- ▶ A fact sheet on the risks petroleum contamination poses to surface and groundwater
- ▶ Brochures explaining Wisconsin codes for farm tanks
- ▶ Four tank decals, required by code
- ▶ Information on state funds for petroleum cleanup
- ▶ The Wisconsin Farm*A*Syst Petroleum Storage and Handling risk assessment worksheet and fact sheet.
- ▶ Spill response information
- ▶ Recordkeeping forms for tanks
- ▶ Information on finding additional assistance

"The materials were professionally done and very well put

together," says Dean Hanley, Energy Department Manager, Danco Prairie FS Co-op. "Farmers are more sophisticated today, and we got some very good comments from the two on-farm demonstrations."

County Fairs

Along with the local county Extension office, the retailers also co-sponsored an educational display, called "A Farm Petroleum Tank Check-Up," at the Columbia, Dane, and Grant county fairs. It provided basic information on tank hazards, USTs, ASTs, and management tips. Simple equipment—like new hoses and automatic shut-off nozzles—was also shown.

The Extension offices also provided technical and outreach support—developing publicity materials, mailing out flyers and news releases, giving local radio and television reports, networking with local officials and organizations, and helping provide free space at the county fairs (space at the Dane County Fair would have otherwise cost \$650).

"In Dane County, it is difficult to reach people unless you use a multi-pronged approach," says Habecker. "You never know if a person will open up a packet and read all of the information; they may prefer to actually see and talk to someone—to get the information 'from the horse's mouth'."

On-Farm Demos

The county agents suggested holding on-farm workshops—"Farm Fuel Tank Demonstrations"—to provide a nonthreatening setting to discuss regulations and liability issues, as well as to show actual farm tanks. The displays from the county fairs



were also used on the farms, and the Extension agents again took the lead in planning and running the demonstrations.

"Having the display gives the project a longer life, since it can be shipped around the state and used in multiple counties," Habecker said. "You can also get more breadth in getting the information out there, without targeting the competitors of the cooperative that you're working with."

Benefits of Partnerships

Once a partnership dynamic gets started, it can easily have a ripple effect, drawing in more and more interest and participation. For example, because of their many and varied contacts, the local Extension agents and petroleum marketers brought in new partners for local activities (e.g., emergency response staff, local fire chiefs, insurance underwriters, and state tank specialists). The on-farm demonstrations also attracted real estate agents, county health officials, environmental consultants, insurance agents, local press, farm press and other petroleum retailers, as well as farmers.

"I'm not sure this project can be seen on our bottom line, but it has an intangible return—a positive effect on our image," Dean Hanley says. "We got a lot of good publicity out of it."

One insurance underwriter was so excited about the project that he began distributing the information to his territorial underwriters as well as all of his farm policy holders. ■

*For more information and to see many of the printed materials described above, check Farm*A*Syst's web page (<http://www.wisc.edu/farmasyst/>) under "Public and Private Partnership." A series of tip sheets related to this project has also been created as part of a kit for petroleum retailers and trade associations.*

*Liz Nevers is Outreach Coordinator for the National Farm*A*Syst/ Home*A*Syst program. She can be reached at (608)265-2774.*

*Farm*A*Syst and Home*A*Syst are voluntary interagency programs that help farmers, ranchers, and homeowners prevent pollution on their lands.*



Enforcement

Field Citations New Hampshire's First Choice For Compliance Enforcement

by Lynn A. Woodard

On July 1, 1994, the New Hampshire Department of Environmental Services (DES) adopted Administrative Rule Part Env-C 603 Field Citation Program for Underground Storage Facilities. In retrospect, the adoption of this rule was a milestone in the state's underground storage tank (UST) program. It was one of only a few distinct actions in the program's history that can be looked back on as a defining point. The administrative fine-field citation has become the first choice as an enforcement mechanism for the UST program...and with good reason. The success rate for payment of the fine and compliance with the regulations for the program's first 2 years was approximately 75 percent. (See graph on page 17.)

Why did we develop the field citation program? I suspect New Hampshire's available enforcement mechanisms and procedures do not substantially differ from those of other states. Typically, if enforcement is initiated against an UST facility, it is in the form of an administrative order, administrative fine, consent agreement, proposed permit revocation, or civil action involving the state's Attorney General's Office. All of these actions require paperwork and levels of review that cause delays in issuance. Furthermore, the fines are severe enough that, if ever issued, they encourage appeals. As a result, valuable time is wasted, and compliance is delayed or not obtained.

Prior to 1994, when DES adopted the field citation rule, only a few enforcement actions had been initiated. Fewer than five enforcement actions were pursued each year. There were two overriding reasons for this inactivity: (1) the program was in its development stage,

and staff time was dedicated to other aspects of the program; and (2) the benefits derived, versus the cost expended (in staff time and other resources), could not justify the action.

We, in the program recognized that if we were to get serious about enforcement, we would need an enforcement mechanism that would be easy to issue and easy to track. Paperwork and review would have to be kept to a minimum. Ideally, such a mechanism would be issued on-site, where, following a compliance audit, the inspector would discuss any violations with the facility owner. To be effective, the fine had to be large enough to convey the message that DES was serious about obtaining compliance, and small enough to ward off an appeal in the majority of cases. The action also had to send a clear message that DES was only interested in protecting the waters of the state and would prefer that the owners and operators spend their resources attaining compliance, not paying expensive fines.

With such a mechanism, DES's goal of gaining compliance with the technical aspects of the UST rule as a means of preventing releases or detecting them early-on could be achieved. The field citation met all of these criteria and more.

Developing The Program

When the idea of developing a state UST field citation program was first proposed, we thought that a statutory modification would be required. The prospect of having to convince a legislative subcommittee that an additional punitive measure was necessary was not a pleasant one. Fortunately, however, our Enforcement Coordinator, an attorney, determined that statutory authority (RSA 146-C) already existed to estab-

lish administrative fines and that the field citation was just an alternate form of the standard administrative fine.

To make our field citation program viable, we had to develop a schedule of fines that was particular to the field citation and separate from the standard administrative fine. We structured the citations such that fines would range from \$25.00 to \$100.00 per violation. The schedule contained a listing of 21 separate violations; each UST system in a facility could constitute a separate violation.

For example, if an UST facility had three tank systems, and each of them failed to have the necessary paperwork for inventory monitoring or tank gauging, DES would assess a fine of \$100 per tank system or \$300. To take this further, the violation could be applied per day or per month, whichever was applicable. As you can see, a simple field citation can begin to add up to real money. To make certain that the effective enforcement criteria were followed, we made the following parameters part of the rule:

- ▶ A fine shall not be proposed for more than \$100 per violation;
- ▶ The total proposed fine shall not exceed \$1,000; and
- ▶ If the total proposed fine exceeds \$500, the amount in excess of \$500 shall be suspended.

If the respondent corrects the violations and pays the \$500 fine within 30 days of the date of the notice, payment of the suspended portion is waived.

Implementing the Program

The rule was adopted with no objection from anyone. Our next step was to obtain authority for UST field inspectors to issue the citations on-site. Heretofore, the authority to

issue a proposed administrative fine had been the purview of the commissioner and/or the division director. In the case of field citations, delegation of authority was transferred to the UST Compliance Section and its staff via an internal memorandum. The field citation program became a high profile pilot project; if it proved to be an effective enforcement tool, it would be cloned for other programs within the DES.

To ensure that citations were not issued for unsubstantiated violations, which would result in unnecessary appeals, and to avoid having proposed fines overturned upon appeal, staff were instructed that facility owners would be afforded at least one chance to come into compliance before a field citation was issued.

As it was, on-site visits to explain regulatory requirements and to demonstrate how best to attain compliance, mailings of deficiency letters, mass mailings containing specific requirements and deadlines, and follow-up post cards were normal procedure. Now, to further ensure the success of the program, initial inspections were targeted to areas where a release was most likely to have the greatest impact (i.e., well-head protection areas) and to those systems that were most likely to have a release (i.e., unprotected bare steel tanks greater than 25 years old). (In New Hampshire, unprotected bare steel tanks greater than 25 years old must be permanently closed.)

To simplify the process even further, during the early stages of the program, our staff members were limited to issuing citations for two types of violations: Those associated with leak detection, and those for unprotected bare steel tanks greater than 25 years old.

Next, DES had to develop the actual citation form, print it, and distribute it to the staff. We decided to use a standard 8.5- x 11-inch page so that we could list all 21 violations with their respective fines. This design method was easy for the inspector and the facility owner to read, so it made for more accuracy in citing the violation. Each page has space for the name of inspector, the name of facility, the date, and the facility owner's signature.

We numbered the citations and assigned a block of these to each

inspector. The back of the form contains the appeals procedure and space for the facility owner to explain the corrective action steps he or she will take and the anticipated date for attaining compliance. This form has been very successful, no appeals have cited the form as the source of any misinformation.

Measuring Results

Compliance is the key to release prevention. When we look at program results, we need to keep in mind the program goal: To encourage compliance with the technical criteria of the rule and thereby prevent or detect releases. To accurately measure the results of the Field Citation program, we made it our business to track the facilities that received field citations and their compliance status.

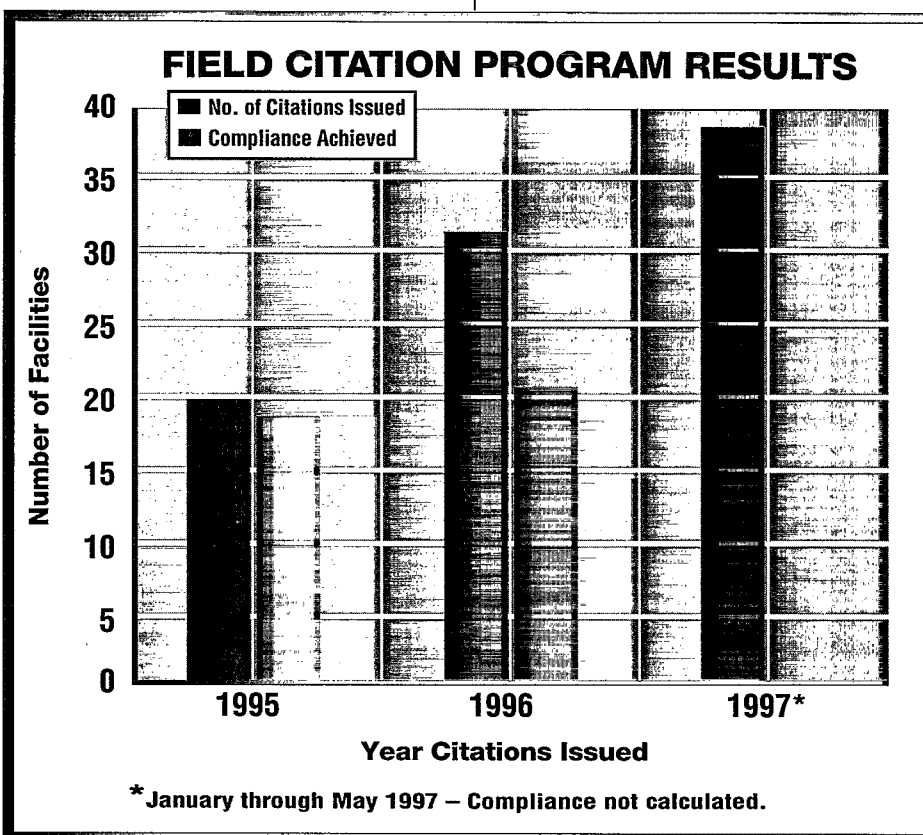
To accomplish this, we developed a Lotus spreadsheet that contained all pertinent information. The spreadsheet was divided into three sections—proposed fine data, negotiations/hearings data, and compliance data. The compliance items were coded and shaded-in when compliance on a particular violation was attained, allowing for a compliance status assessment at a glance.

Authority to use the field citation was available in July 1994. Development of the citation form and other administrative needs, however, delayed issuance of the first citation until late January 1995. Since then, 90 field citations have been issued—20 in 1995, 32 in 1996, and 38 as of the end of May 1997. (See the "Field Citation Program Results" graph.)

Compliance rates for 1995 (18 out of 20) and for 1996 (21 out of 32) are 90 percent and 65 percent respectively. However, these numbers, alone, do not show how really successful the program has been. For example, many of the facilities represented as remaining out of compliance have, in fact, established a schedule with DES for coming into compliance. A secondary benefit, but one that is just as important but impossible to measure, is the number of facilities that voluntarily attained compliance because of this field citation initiative.

One benefit of the program that can be measured is leverage. When a field citation is issued to an owner with multiple facilities, DES leverages its assets by requiring that the owner reconcile the compliance

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■ NH Field Citations from page 17

records for all his/her facilities with the DES UST Compliance Section. Thus, if deficiencies are noted, the owner is required to establish a schedule for returning all facilities to compliance. By issuing 90 field citations, we have addressed compliance at 220 UST facilities.

Effective In More Ways Than One

The field citation has proven to be a highly effective compliance enforcement mechanism. It has had the effect of streamlining the state's UST compliance enforcement program. Prior to its adoption, the issuance of 90 standard proposed administrative fines, associated hearings, and subsequent determinations during an equal period of time for one program would have been unheard of. It would have severely overburdened the system and transmitted the message that the enforcement program was ineffective.

The adoption and implementation of the Field Citation program has been an effective mechanism in gaining compliance in communities with wellhead protection areas to protect valuable drinking water resources. It has been a major factor in encouraging facility owners to permanently close unprotected single-walled steel tanks greater than 25 years old, thereby preventing releases from occurring.

By preventing releases we have reduced the potential number of new leaking underground storage tank sites. This, in turn, has reduced the number of claims on the state reimbursement fund and has saved the fund hundreds of thousands of dollars. The saved dollars are available to fund the investigation and clean up of other sites.

Finally, lest we forget, December 22, 1998 looms on the horizon. Because this enforcement mechanism is already in place and has been tested, it will be called upon as the initial enforcement mechanism to be used for those facilities that do not meet the 1998 compliance deadline. ■

Lynn Woodard is Supervisor of the NHDES Oil Compliance and Initial Response Section.

Investigation and Remediation

MTBE – Beware the False Positive

by Blayne Hartman

What is the official EPA method for measuring MTBE in soil and water samples? Actually, there is no official method. And herein lies the potential problem with reported MTBE results.



Increased concern over the presence of MTBE in the environment by the regulatory community has created a demand for MTBE analyses from soil and water samples collected from LUST sites. Because no official EPA method exists, laboratories have modified a variety of EPA methods to analyze for MTBE. The most commonly used methods are EPA 8020, 8240, and 8260. While results provided by these methods may be fine, both regulators and consultants need to be aware that there are critical differences among these methods which, if not understood, could lead to the incorrect interpretation of reported MTBE values.

EPA Method 8020 is a gas chromatography (GC) method that uses a photoionization detector (PID). The method is designed to detect aromatic hydrocarbons, the most commonly targeted compounds of which are benzene, toluene, ethylbenzene, and xylenes (BTEX). MTBE can also be detected by this method. MTBE elutes, or passes through the detector, earlier in the analytical run than the BTEX compounds, which means that it takes no additional time to analyze a sample for MTBE. As a consequence, some laboratories have included MTBE in their 8020 analytical runs for little to no extra charge. But as the saying goes: "Beware the free lunch."

Because of pricing pressures, many analytical laboratories have compressed the "run time" for 8020 from 20 minutes to less than 10 minutes. This reduced run time increases the potential for compounds to co-elute (i.e., pass through the detector together) and be misidentified. This problem can be especially significant

for MTBE because several alkane compounds elute close to MTBE and are present in gasoline in large quantities. The result is false positives—over reported MTBE values that result from the co-elution of the alkanes. This problem is greatest for soil vapor and soil samples, but it can be significant for groundwater samples as well.

EPA methods 8240 and 8260 are gas chromatography methods that use a mass selective detector (GC-MS). These detectors differ from other typical GC detectors because they have the ability to identify compounds based on their masses. This means that MTBE can be recognized and quantified individually, even if other compounds are co-eluting with it. Thus, MTBE values from these methods tend to be more reliable and false positives should not occur. This analysis, however, is more expensive than an 8020 analysis.

The solution? Use a combination of these methods to ensure valid results and minimize costs. Nondetect MTBE values reported by method 8020 should be fine. MTBE values from samples with low gasoline values (<5000 ug/l and 100 mg/kg) are more likely to be reliable because low values of the co-eluting alkanes are also likely. As gasoline values increase, so does the potential for over-reported MTBE values. Depending on site-specific goals, it is advisable to confirm a subset of the MTBE results reported by method 8020 by one of the GC-MS methods. ■

Blayne Hartman, Ph.D., is Vice President and Technical Director of TEG, Inc. in Solana Beach, California. For more information, contact Blayne by e-mail at bh@tegen.com.

Investigation and Remediation

EXPEDITED SITE ASSESSMENTS

Now Available

EPA's New Guide on Expedited Assessment Tools For UST Sites

EPA has developed a guide to help UST regulators evaluate and promote expedited site assessments at UST sites. *Expedited Site Assessment Tools For Underground Storage Tank Sites: A Guide For Regulators* (510-B-97-001) is designed to enable the reader to answer the following basic questions about site assessments at UST facilities:

- ▶ What is an expedited site assessment?
- ▶ How is an expedited site assessment conducted?
- ▶ What equipment can be used in an expedited site assessment?
- ▶ Under what site conditions are specific site assessment tools appropriate?

EPA's Office of Underground Storage Tanks (OUST) estimates that

at least 360,000 sites are likely to require site assessments in the next few years. The majority of these assessments will result from owners' and operators' closing or replacing old tanks to comply with the '98 deadline. Additional assessments will be required to investigate backlogged sites and new releases.

There have been many improvements in site assessment technologies over the last few years. When they are systematically integrated into the site assessment process, these new technologies can speed up the on-site decision-making process.

As the first step in the corrective action process, site assessments are critical to making appropriate remediation decisions. Expedited site assessments can streamline the corrective action process, improve

data collection, and reduce the overall cost of remediation.

The new EPA guide is organized into six chapters: Introduction, The Expedited Site Assessment Process, Surface Geophysical Methods, Soil Gas Surveys, Direct Push Technologies, and Field Methods for the Analysis of Petroleum Hydrocarbons. It is designed for federal, state, and local regulators who review corrective action plans and site assessment reports. It will also be useful to consultants, engineers, lenders, public health professionals, and others involved in the cleanup or remediation of LUST sites.

The guide is available for \$26.00 from the U.S. Government Printing Office (GPO), Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. Order stock number 055-000-00564-8. ■



Connecticut DEP Developing Multimedia Expedited Site Assessment Guidelines For LUST Sites

Under contract to the LUST Trust Fund Program of the Connecticut Department of Environmental Protection (DEP), and with additional support from the Connecticut Department of Public Works, Professor Gary A. Robbins at the Department of Geology & Geophysics of the University of Connecticut is developing multimedia guidance on conducting expedited site assessments at UST sites. The guidance is being developed to help the regulated community, environmental consultants, and DEP contractors achieve improved UST site remediation approaches.

To date, two reports in hard copy and on-line have been issued. These are:

- ▶ *Recommended Guidelines For Applying Field Screening Methods in Conducting Expedited Site Investigations at Underground Storage Tank Sites in Connecticut* (November 30, 1996) and
- ▶ *Recommended Guidelines For Multilevel Sampling of Soil and Groundwater in Conducting Expedited Site Investigations at Underground Storage Tank Sites in Connecticut* (March 12, 1997).

A third report entitled, *Recommended Guidelines For Evaluating Three-Dimensional and Hydrogeologic Data Obtained in Conducting Expedited Site Investigations at Underground Storage Tank Sites in Connecticut* is due out next year on CD-ROM.

These guidance reports stress the need to delineate the three-dimensional distribution of gasoline and diesel fuel contamination above and below the water table. The reports provide recommendations on sampling, determining pertinent

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■ Conn DEP from page 19

hydrogeologic properties, estimating contaminant mass and attenuation rates, and presenting data. In this regard, the guidance reports complement and supplement EPA's recently completed document on expedited site assessment for regulators (see preceding article), but provide more detail in terms of field application. The reports emphasize the application of direct push methods for sampling and the use of field screening techniques for delineating contamination.

The guidance presented in these reports is based on long-term research conducted at the University of Connecticut and project-specific efforts that entailed literature reviews on field analytical methods and multilevel sampling, a survey of manufacturers of field screening methods and equipment for conducting multilevel sampling, laboratory tests of field analytical methods, and field tests of select analytical and sampling methods at UST sites in Connecticut.

Field testing included comparisons of different methods for conducting multilevel groundwater sampling and soil sampling below the water table for entrapped product using direct push methods. This year's efforts include comparisons of data obtained from conventional and expedited site assessment approaches. Also, evaluations are being performed to assess the effectiveness of remediation approaches at several UST sites that were based on three-dimensional data collected in conducting expedited site assessments.

Hard copies of the above reports may be obtained by contacting the Connecticut DEP Maps and Publications Sales Center, 79 Elm Street, Hartford CT 06106 or by calling (860) 424-3555. There is a fee of \$5.00 per document. The reports are also available for viewing on-line at: www.sp.uconn.edu/~hydrogeo/deprept.htm using the free software Adobe® Acrobat Reader 3.0. The web site has directions on how to get the software for viewing. ■

EPA Concerned About Schaefer/Allard LUST Trust Fund Legislation

On April 23, the House of Representatives passed the Schaefer bill, HR. 688, the "Leaking Underground Storage Tank Trust Fund Amendments Act of 1997." Senator Allard (R-Colorado) introduced an almost identical bill, S. 555, on April 10. This legislation expands the use of the federal LUST Trust Fund, allowing the fund to be used to supplement state UST assurance/cleanup funds to reimburse responsible parties for the costs of cleanup and to pay state fund administrative expenses and to enforce UST release prevention technical standards. The legislation also mandates that EPA distribute at least 85 percent of the LUST Trust annual appropriations to the states and explicitly prohibits the use of the fund for upgrade, replacement, or closure of old tanks.

Since the Schaefer bill was first introduced, EPA has voiced concerns about the implications of this legislation; primarily from the standpoint that the legislation essentially takes an existing pot of money and spreads it over a broader range of allowable uses.

The LUST Trust Fund program was originally authorized under the 1986 Superfund Amendments and Reauthorization Act and was reauthorized for 5 years in December 1990. It was funded by a 0.1 cent per gallon tax on motor fuel. Although authority to collect the tax expired in December 1995, Congress can continue to appropriate funds. Approximately \$1.0 billion remains in the fund. The President is requesting reinstatement of the tax in FY-98.

At present the fund may be used for site cleanups, where the owner/operator is unwilling, unknown, or insolvent; for oversight

of responsible party (RP) cleanups and enforcement; and for general support and management.

Since the Schaefer bill was first introduced, EPA has voiced concerns about the implications of this legislation; primarily from the standpoint that the legislation essentially takes an existing pot of money (i.e., EPA's annual appropriation from Congress) and spreads it over a broader range of allowable uses. With this fact in mind, the Agency has three major concerns.

First, at current appropriations levels, EPA is concerned that by supplementing state financial assurance funds with money from the LUST Trust Fund, resources needed to oversee RP cleanups and remediate abandoned sites could be diverted, thereby reducing protection of human health and the environment.

EPA's second concern also has to do with supplementing state cleanup funds in that federal dollars would be used to reimburse RPs who are known, willing, and able to pay for cleanups. The LUST Trust Fund was not designed to provide funding for cleanups on behalf of solvent, viable responsible parties.

Finally, H.R. 688 and S. 555 would codify EPA's grant award patterns, specifically requiring that at least 85 percent of Trust Fund appropriations be distributed to the states. While historically, EPA has awarded states approximately 85 percent of its annual Trust Fund appropriation, the agency believes that it should maintain the flexibility to revise the percentage distribution and allocation formula for distributing monies to the states. The Agency feels that such flexibility allows it to respond more appropriately as environmental risks and resource levels change and to fulfill its responsibility in Indian Country, which includes emergency response and corrective action.

EPA does support the enforcement uses of the LUST Trust Fund provided in the new legislation. ■

Investigation and Remediation



CAFI Anyone? Selecting the Right Cleanup Technology for a Site

by Richard Spiese and Chuck Schwer

In the "good old days" in Vermont, the state site manager went to most LUST sites and, with the assistance of the responsible party's (RP's) consultant, performed a preliminary on-site evaluation of the severity of the LUST contamination and the risk it posed to sensitive receptors. Based on this evaluation, the site manager and the consultant determined what type of remediation method, if any, was needed to contain and remediate the contamination. This decision was often based more on past experience than on site-specific data. In many cases, these decisions were made within days or weeks of discovering the release, and usually without the benefit of on-site pilot tests to evaluate the effectiveness of the chosen technology.

By the early 1990s, however, this *modus operandi* began to change, primarily in response to a proliferation of LUST sites. No longer could program personnel visit every site. Instead, they spent an increasing portion of their time reviewing consultant reports and evaluating the effectiveness of site cleanups. In doing this, they soon learned that many of the remedial decisions made in the past were less than perfect. Assumptions that had been made in the field were often not completely accurate, and remedial systems sometimes needed modifications to reflect the different site conditions.

In 1994, in response to this finding, the Vermont LUST program adopted the Corrective Action Feasibility Investigation, or CAFI, approach to selecting cleanup strategies. Under this new approach, before a cleanup technology is selected, a formal CAFI must be performed. The CAFI must contain specified elements that are deemed necessary for determining the appropriate corrective action technology for a given site.

The RP's consultant must evaluate one or more technologies that are appropriate to the unique conditions of the site, perform an on-site pilot test, evaluate risk, and justify the selection of the recommended technology. The CAFI allows for the review of natural attenuation as a corrective action technology. It also calls for a review of the costs of different technologies and a cost-benefit analysis of the different remedial options. Depending on site-specific conditions (e.g., geology, receptors), a CAFI may be straightforward (e.g., a report on the results of a pilot test) or more complex (e.g., a formal review of multiple applicable technologies).

Refreshingly Cost-Effective

In preparation for the Sixth Annual State Fund Administrators Conference this June, Vermont LUST program staff evaluated the average costs of cleanup at CAFI sites versus non-CAFI sites. This evaluation provided us with three exciting pieces of information about sites where formal CAFIs had been completed:

- ▶ The remedial costs were often reduced;
- ▶ The duration of the remediation was often shortened; and
- ▶ Expensive remediation costs were avoided at sites where remediation was found to be technically infeasible.

The average cost of remediating sites where formal CAFIs were completed was significantly less than that of remediating sites where no formal CAFIs were prepared. Although most site managers expected this to be the case, all were surprised by the magnitude of this savings.

A review of the costs of preparing a CAFI showed that the average cost for performing and reporting a CAFI was \$8,500.00; the range was

from \$1,300.00 to \$32,350.00. These differences in costs were based mostly on the complexity of the site and whether one or multiple remediation technologies were evaluated.

The average cost of cleanup for sites without a formal CAFI was \$261,930 (based on the review of remediation costs at 30 sites), whereas the average cost of cleanup for sites with a formal CAFI was \$174,049 (based on the review of remediation costs at 15 sites). These data represent a per site savings of almost \$100,000.00! Not bad for an investment of only \$8,500.

At seven sites where a CAFI had been completed, the CAFI indicated that site conditions were such that any corrective actions other than natural attenuation were technically infeasible. In these instances, the average cost of the initial site investigation, preparation of the CAFI, and long-term monitoring was \$60,000.00.

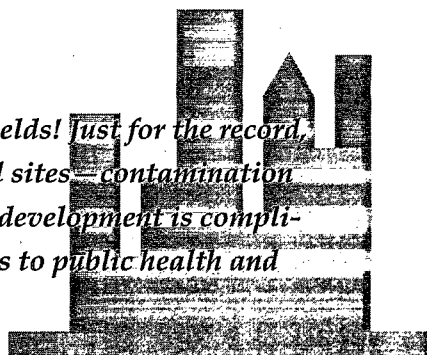
Although most of the cleanups initiated without a CAFI were successful, many of the approaches needed to be modified, expanded, or changed after they were implemented. These modifications ultimately increased the cost of the cleanup.

In Vermont, we have found that it is a good investment in time and money to thoroughly evaluate all potential site cleanup technologies before deciding on a final remediation technology. Vermont's LUST cleanup program now requires the preparation of a formal CAFI at all sites, except in emergency situations...and a nice hot cup of java to reward all involved. ■

Richard Spiese and Chuck Schwer are with the Vermont Department of Environmental Conservation Waste Site Cleanup program.

LUST in the Brownfields

Brownfields, brownfields, brownfields...everybody's talking about brownfields! Just for the record, brownfields are abandoned, idled, or under-used industrial or commercial sites—contamination casualties resulting from decades of industrial activity—where expansion or redevelopment is complicated by real or perceived environmental contamination. Brownfields pose risks to public health and create zones of environmental blight in many communities.



While brownfields are found in suburban and rural areas, the problem is most prevalent in urban areas where many properties that would otherwise be prime for development lie dormant because they are tainted by hazardous wastes, as well as by leaks and spills from underground and aboveground storage systems.

Private parties are reluctant to invest in these properties because of liability concerns and cleanup cost uncertainties. Financing is difficult to obtain because lenders fear that environmental and legal obstacles will make it difficult for borrowers to repay their loans. These circumstances prompt developers to shift their attention to clean sites in rural or suburban communities while the brownfields—prime urban and industrial sites that are already served by transportation infrastructure and utilities—remain abandoned or unproductive.

Throughout the country, the cleanup and redevelopment of brownfields is being seen as a key to the revitalization of urban areas. Putting these properties into productive use can create jobs and increase local tax revenues. It can also help slow "urban sprawl" and the problems that go with it, including increased air pollution and loss of open space.

EPA and many states see the need for a coordinated response to the brownfield situation and have begun developing programs to specifically address problems common to brownfield sites. EPA's Brownfields Redevelopment Initiative, for example, was established with the mission of preventing brownfields from coming about in the first place and cleaning up existing brownfields in an effective and timely manner.

Across the country, there are approximately 450,000 real or per-

ceived brownfield sites. In an effort to remove obstacles in the way of performing brownfield assessments and cleanups, EPA is trying to ease the stringent liability scheme imposed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). These efforts include creating comfort, or closure, letters that certify that a site is clean, clarifying lender liability provisions, and exploring the use of state voluntary cleanup programs at low priority, non-National Priority List sites.

"State program managers should keep abreast of what is happening in their states, especially if certain provisions of proposed legislation may have a negative impact on their program."

Sammy Ng, EPA Office of Underground Storage Tanks

Where LUSTs Are Concerned

While brownfields are usually associated with Superfund or hazardous waste sites, many of these sites are actually former commercial and industrial sites that contained old or abandoned USTs. In fact, in some areas, UST sites may account for half of the brownfields sites. Unfortunately, because of this link with Superfund sites, most of the federal, and an increasing number of state, activities have focused on the difficulties in addressing these sites under current Superfund policies and procedures.


"These activities, such as state voluntary cleanup programs and liability schemes, while addressing the problems usually associated with the

Superfund program, can also affect a state's UST/LUST program," says Sammy Ng of EPA's Office of Underground Storage Tanks, "especially with regard to the cleanup and redevelopment of UST sites. State voluntary cleanup programs will likely set forth a whole new way of doing cleanups.

"These voluntary cleanup programs are generally designed to streamline Superfund cleanups," explains Ng. "If state LUST programs are included under these programs, it could create additional hurdles for LUST program cleanups. As a very simplified example, a state's Superfund cleanup program could be streamlined from 50-steps to 10-steps. Yet, that state's LUST program may use a 5-step process. There is the potential, then, that LUST sites that fall under the state's brownfields program could be subject to the more complicated 10-step process."

Also, in an effort to secure the timely turnaround of brownfield sites, state LUST program managers may be asked to sign off on sites through the issuance of closure letters. This could create extra work for already taxed LUST programs by creating an additional set of priorities.

"We suggest that state LUST program managers be vigilant," says Ng. "State program managers should keep abreast of what is happening in their states, especially if certain provisions of proposed legislation may have a negative impact on their program. Some recently passed brownfield legislation in Maryland and Michigan did affect USTs. Depending on how they are defined from state to state, brownfields can be a plus or a minus in meeting state LUST program goals." ■



Coast to Coast

from the ASTSWMO Tanks Subcommittee

Coast to Coast is provided as a regular feature of *LUSTLine* to update state and federal UST, LUST, and cleanup fund personnel about the activities of the Association of State and Territorial Solid Waste Management Officials' (ASTSWMO) Tanks Subcommittee. If you want to learn more about the Tanks Subcommittee, contact the Subcommittee Chair, Scott Winters (CO) at 303/620-4008, or Stephen Crimaudo (ASTSWMO) at 202/624-5828.

Tanks Subcommittee

The Tanks Subcommittee has been very active over the last 6 months on a variety of issues of concern to state UST programs. The Subcommittee met in April at the Mid-year ASTSWMO meeting in New Orleans. All four task forces were represented at this meeting, and good progress was made on a variety of issues, including the UST "Report Card," which is currently undergoing revisions. For information on overall Tanks Subcommittee activities, contact Subcommittee Chair, Scott Winters (CO) at (303) 620-4008.

UST Task Force

The UST Task Force has been busy on a number of important UST issues. Many of these issues are driven by the 1998 deadline for upgrading of USTs. The Task Force continues to work on the "Report Card on the Federal UST/LUST program." As this project now includes all the Task Forces in the Tanks Subcommittee, the TIE Task Force has taken the lead as project coordinator.

The UST Task Force has also provided comments for the development of an EPA - OUST/ASTM standard for certifying UST compliance with the 1998 technical standards. This proposed ALICE (Acceptable Liability and Compliance Evaluation) standard is developing into a tool that states and OUST may use to increase 1998 compliance.

For more information on UST Task Force activities, contact Task Force Chair, Paul Sausville (NY) at (518) 457-4351.

LUST Task Force

The LUST Task Force has been very active over the last year and has a full agenda for the upcoming year. Completed activities include an article for the *Underground Tank Technology Update* (UTTU) newsletter on natural attenuation, comments on the Lawrence Livermore National Laboratory (LLNL) *Report on Leaking Underground Storage Tank Cleanups*, presented to the California State Water Resources Control Board (SWRCB), and a letter addressing the LUST Trust Fund Allocation Formula and its impact on state LUST Programs.

Ongoing projects include work on the "Report Card on the Federal UST/LUST program," review of several innovative technologies, participation on the EPA/OUST MTBE workgroup, and participation in National Conferences as they pertain to LUST issues.

Future planned projects include producing a document on possible environmental indicators that may be used as a state LUST program tool, reviewing and commenting on the Texas and Florida risk and RBCA reports, and preparing a web page on innovative LUST technologies.

For more information pertaining to LUST Task Force activities, contact co-chairs Kevin Kratina (NJ) at (609) 633-1415, or Richard Spiese (VT) at (802) 241-3880.

State Cleanup Funds Task Force

The State Cleanup Funds Task Force just completed a very successful Sixth Annual State Fund Administrators Conference held in Sacramento, CA from June 16-18, 1997. Much of the Task Force's efforts prior to the conference centered on preparing for the sessions of the conference. The Task Force (a.k.a., State Fund Administrators Association) completed a "Summary of State Fund Survey Results" and a "State Fund Success Stories Compendium, Second Edition" for presentation at the conference.

The conference had many informative and entertaining sessions, including the following large group sessions: A review of the State Fund Survey results by Chuck Schwer (VT), "Issues Shaping State Funds" by Dave Deaner (CA), Jana Harris (OK), and Randy Taylor (UT), "Life with RBCA and Natural Attenuation" by Dennis Rounds (SD) and Hal White (EPA OUST), "Unconstitutional State Funds and Other Legal Follies" presented by Mary-Ellen Kendall (VA) and Dean Lerner (IA), and "State Funds: Talk Back Live with Dan and Dennis" by Dan Neal (TX) and Dennis Rounds (SD).

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■ Coast to Coast *from page 23*

Small group sessions included the following topics: MTBE Remediation, Common-Sense Closures, Cost Control Roundtable, Forecasting, Solvency, and Cash Flow Roundtable, Pay for Performance Workshops, Living with Residual Contamination, Remediation Equipment Inventory Roundtable, Corrective Action Sessions I & II, State RBCA Roundtable, Cost Recovery, Natural Attenuation, Planning for Sunsets, 1998 and Beyond Roundtable, and Harnessing the Power of Your Stakeholders Roundtable. As this list shows, the conference covered a wide array of state fund issues. Planning has already begun for next year's conference.

Awards for the best State Fund Success Stories were presented by Ellen Frye of NEIWPCC and Steve Crimauo of ASTSWMO on the last day of the conference. The categories of awards were: Best

Financial Achievement, awarded to South Dakota; Best Managerial (Policy/Management) Achievement, awarded to Ohio; and Best Fund For Getting the Job Done, awarded to South Carolina.

At the close of the conference, the State Funds Administrators Association chairmanship was turned over to George Matthis of North Carolina. Dan Neal, who served as Chairperson of the Task Force/Association for the past 2 years, will continue as co-chair and active member of the Task Force. Thank you Dan for 2 years of dedicated and inspiring leadership.

For more information on the work of the State Cleanup Funds Task Force or the Annual Conferences, contact Dan Neal (TX) at (512) 239-2258 or George Matthis (NC) at (919) 733-9413.

TIE Task Force

The Training and Information Exchange (TIE) Committee has seen much change over the last year. This change began with a total turnover in Task Force membership. The new Chairperson of this Task Force is Kathy Stiller of Delaware. Other new members include George Matthis (NC) and Juan Sexton (KS). Major efforts of the TIE Task Force include the successful planning and implementation of the mid-year meeting in New Orleans, continued work on the "Report card on the Federal UST/LUST program," continued work on ASTSWMO's Internet home page, and planning for the 1997 Annual ASTSWMO Meeting.

If you have questions or comments on TIE Task Force activities, call Task Force Chair, Kathy Stiller (DE) at (302) 323-4588.

■ Is Leak Detection Working? *from page 3*

point where all UST systems are perpetually tight. The sheer number of active UST facilities, combined with the human propensity to make mistakes, guarantees that leaks will be with us for a long time. The question is, will we find them sooner? Or later?

To Err Is Human

As a footnote, it is clear to me that lack of owner/operator understanding of leak detection is a key factor contributing to the ineffectiveness of leak detection methods. Few owner/operators understand inventory control well enough to believe what it is telling them. Few on-site personnel really understand ATGs.

Even secondary containment is beyond the ken of many. On some recent facility inspections, I encountered sincere, well-meaning operators of secondarily contained tanks who were using manual monitoring to meet their leak detection responsibilities. Unfortunately, one was sticking his float vent valve thinking it was his interstitial space, the other was sticking his primary tank for the presence of water, thinking this was leak detection. We have a long way to go in the realm of educating the UST owner/operator population. ■

Marcel Moreau is a nationally recognized petroleum storage specialist whose column, "Tank-nically Speaking," appears as a regular feature in LUSTLine.

■ Georgia *from page 12*

nation and grain-size analysis tests are run, new information is input into the model. Using this model, Georgia staffers are able to run site-specific evaluations. By comparing known conditions at a site with higher risk scenarios, these same staffers can quickly assess if this site really needs further assessment, or if it can be closed with "no further action."

We expect this approach will eliminate the invasive and costly site investigations that normally follow the discovery of contamination at a facility. We are really operating on the "80-20 rule," which suggests that 80 percent of the sites are low risk, while the other 20 percent might have significant problems. With this method, we are able to focus limited funds on the high risk sites, while quickly resolving the rest. In taking this approach, we expect to decrease the cost of assessment and remediation efforts from \$50 million to less than \$20 million.

So, here's the bottom line: From an early cost estimate of about \$100 million to deal with tank replacements and cleanups for some 1,000 sites, we are now down to a cost of about \$35 million. This is a 65 percent reduction, quite a figure for anyone. ■

Jill Stuckey and Robert Wiggins are now beginning their third year with the UST Management Group program.

They expect to complete all work within 3 years. For those who have questions, they may be reached at (404) 657-1324.

EPA HQ UPDATE

Enforcement Initiative

During May 1997, the states and EPA undertook a joint effort to focus attention on their commitment to enforce the UST regulations. Together, states and EPA inspected about 9,000 UST facilities. Violations of the release detection requirements were identified at more than 2,500 of the facilities inspected. States and EPA issued 1,700 Notices of Violation, 750 warning letters, and 400 field citations. Formal enforcement actions were recommended or initiated in several cases. States and EPA proposed or collected fines totaling more than \$900,000; large fines proposed in three cases in Region 2 accounted for more than half of the total.

Recent OUST Publications

Unless otherwise noted, you can download material listed below (in WordPerfect 6.1) from OUST's World Wide Web Home Page at <http://www.epa.gov/OUST/>.

Printed copies are available from NCEPI by calling (800) 490-9198, or faxing (513) 891-6685, or via EPA's toll-free Hotline at 800-424-9346.

■ **Ordering Information On Underground Storage Tanks** (EPA-510-F-97-003). This leaflet is intended for UST owners / operators, but it is suitable for response to request from the general public and UST-related sectors. The purpose of the leaflet is to help UST owners and operators obtain free informational leaflets, booklets, and videos that can help them comply with the federal UST requirements. All materials listed urge readers to check with state and local regulatory authorities for additional or more stringent requirements.

■ **PIRI Issue Papers** (EPA-510-R-97-001). This collection of technical issue papers was

written by EPA, state, and industry members of the Partnership In RBCA Implementation (PIRI). PIRI is a collaboration of industry, states, EPA and ASTM. PIRI was established to encourage and support state efforts to implement a risk-based approach to corrective action at federally regulated UST sites involving releases of petroleum or petroleum products. In a series of papers they have authored, individual PIRI members discuss issues involved in implementing RBCA and present options for overcoming obstacles.

The papers discuss RBCA issues associated with natural attenuation; the definition of contaminant, and no further action letters; selection of carcinogenic target risk levels for soil and groundwater remediation; off-site movement of chemicals of concern; institutional controls; groundwater nondegradation policies; and using TPH. All papers represent only the views of their authors; they do not reflect official EPA policy or the positions of PIRI member organizations. If you do not have Internet access, you may order a copy of the *PIRI Issue Papers* by calling 800-490-9198.

■ Tank Time.

Developed by the Tennessee Department of Environmental Conservation's Division of Underground Storage Tanks, in collaboration with EPA OUST, this new video used a fictional TV show, "Tank Time," to present an amusing discussion of the federal 1998 requirements for corrosion protection, spill and overfill prevention, and compliance options available to UST owners and operators. Tennessee staff wrote the script to be generally applicable to UST owners and operators nationwide; however, the video does note that state requirements may differ and urges viewers to check with their state authorities.

Tennessee sent a copy of the video, along with a state-prepared booklet, to every registered tank

owner or operator in the state. EPA sent a copy of the video to every state UST program manager and EPA regional UST program manager. *Tank Time* is available for sale from Scene Three, Inc., the Nashville company that produced the video, for \$24.00 (\$15.50 per tape plus \$8.50 for shipping and handling). Scene Three will quote prices for orders of more than 15 copies. To order, send a written request and check to: Scene Three, Inc., 1913 8th Avenue South, Nashville, TN 37203, Attention: Tank Time.

■ State Third-Party Service Provider Programs: Augmenting State UST Programs

(EPA-510-B-97-003). This booklet is for state officials who may be considering the use of third-party service provider programs to increase their UST program's capabilities. Few, if any, states have the staff resources needed to support all of the high priority UST activities they might like to undertake. EPA OUST produced this booklet to provide general information about third-party service provider programs, including their benefits and costs. The booklet describes Pennsylvania's experience with its third-party inspector program and Massachusetts' experience with its Licensed Site Professional program. These models may be useful to states intending to set up similar third-party programs.

■ State Funds In Transition: Models For Underground Storage Tank Assurance Funds

(EPA 510-B-97-002). This booklet, which is intended for state fund officials who are considering changes and alternatives to their state funds, presents case studies describing some of the activities that three states have conducted in making a transition from a state fund program to other financial assurance mechanisms. The booklet also describes five programs

■ *continued on page 27*

EPA Stands Firm on the 1998 Deadline

This recent memorandum from EPA Administrator Carol Browner affirms the Agency's commitment to maintaining and enforcing the December 1998 deadline for upgrading, replacing, or closing underground storage tanks.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

MEMORANDUM

SUBJECT: No Extension of December 1998 Deadline for Upgrading,
Replacing, or Closing Underground Storage Tanks

TO: Regional Administrators

Under regulations issued more than eight years ago, owners and operators of underground storage tanks (USTs) have until December 22, 1998 to upgrade, replace, or close USTs that do not meet EPA's technical standards for protection against spills, overfills, and corrosion.

I want you, as well as our State partners and UST owners and operators, to know that EPA does not intend to extend this deadline. While I recognize that there will not be 100 percent compliance by the deadline, extending it would reduce the incentive to comply and would be unfair to the many UST owners and operators who have already complied.

The 1998 requirements are a key element in the ongoing State-EPA effort to prevent groundwater contamination. States have told us that USTs are their most common source of groundwater contamination and that petroleum is the most common contaminant. In many cases, UST releases have resulted in contamination of public or private drinking water supplies.

I know that EPA's Regional Offices and the States have been working with UST owners and operators to encourage compliance in advance of the deadline. I urge you not only to continue these efforts but also to begin working with the States to develop plans for dealing with those owners and operators who fail or refuse to comply with the requirements.

Carol M. Browner
Carol M. Browner

EPA HQ UPDATE con't

that might serve as "models" for states that have decided to change the structure of their state funds.

■ 1997 Flexible Piping Survey

Because flexible piping systems differ significantly from the more traditional steel and fiberglass piping systems, EPA OUST has periodically commissioned a survey of flexible piping manufacturers. This new survey updates a similar flexible piping survey published in 1995. The 1997 survey includes information on which companies are making flex pipe, product name, construction, compatibility, diameter available, date of first installation, number of installations, installer training required and/or provided, minimum bend radius, test pressure, listings, and materials warranty.

Copies can be downloaded from OUST's Home Page (see above.)

■ UST Program Facts: Implementing Federal Requirements For Underground Storage Tanks

(EPA-510-B-96-007). This booklet, which is a revised, updated edition of *UST Program Facts*, contains a new section on "brownfields." The booklet was designed mainly for state and EPA staff, but other interested parties will find it useful. It should help regulators handle press inquiries, prepare briefings/presentations, respond to legislators' questions, write speeches, and provide information to other agencies and the public.

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We welcome your comments and suggestions on any of our articles.

National Statistics On State Petroleum Cleanup Funds

This Annual Survey of State Cleanup Funds was updated by the Vermont Department of Environmental Conservation for the 6th Annual State Fund Administrators Conference held in June in Sacramento, California. Numbers represent combined totals for all states with funds.

	1993	1994	1995	1996	1997
Number of states with funds	43	45	46	47	47
Annual revenues (\$ in billions)	904	1.053	1.041	1.169	1.311
Current balance (\$ in billions)	.811	1.039	1.143	1.308	1.344
Outstanding claims (\$ in billions)		1.374	1.501	2.833	2.320
Total number of sites covered under funds				170,254	224,290
Total number of tanks covered under funds				1,292,919	1,486,365
# of sites with claims	48,296	60,654	66,095	81,879	89,544
# sites with 3rd party claims	108	167	330	458	598
# of claims received	44,406	78,125	113,498	149,129	178,169
Total amount paid (\$ in billions)	1.067	1.591	2.490	3.677	4.555
Average cost per site (\$)		59,336	67,297	53,194	107,975
States with claims > balance			11	19	18
# of states which will transition to private insurance				3 yrs: 4 5 yrs: 1 7 yrs: 2	3 yrs: 4 5 yrs: 2 7 yrs: 5
# of states with fund sunset date before 2000				10	10 *
# of states w fund sunset date beyond 2000				4	4

*Alaska, Iowa, and Michigan have reached their sunset dates.

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